Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Pathology

Steatosis and Steatohepatitis in Autopsy Specimens of Liver

Dr. Sabrina Razzaque[1*], Dr. Shegufta Sharmin[2], Dr. Nahid Kaizer[3]

[1]Associate Professor, Department of Pathology, Medical College for Women and Hospital, Dhaka, Bangladesh
[2]Associate Professor, Department of Pathology, Shaheed Monsur Ali Medical College, Dhaka, Bangladesh
[3]Associate professor and Head, Department of Pathology, Shahabuddin Medical College and Hospital, Dhaka, Bangladesh

DOI: 10.36347/sjams.2023.v11i05.014 | **Received:** 08.04.2023 | **Accepted:** 14.05.2023 | **Published:** 18.05.2023

***Corresponding author:** Dr. Sabrina Razzaque
Associate Professor, Department of Pathology, Medical College for Women and Hospital, Dhaka, Bangladesh

Abstract **Original Research Article**

***Background*:** Liver is the site of many diseases, many of which become symptomatic while some are diagnosed only on autopsy. Involvement of liver is secondary to cardiac, metabolic, social problem like alcoholism, drug toxicity, herbal remedies and environmental exposures. ***Objectives*:** This study aims at finding the frequency of steatosis and steatohepatitis in autopsy specimens of liver. ***Methods*:** This was a descriptive cross-sectional study carried out at the Department of Pathology, Dhaka Medical College, Dhaka over a period of 2011-2012. Liver samples of postmortem cases from the Department of Forensic Medicine, Dhaka Medical College and autopsy samples of liver received at the Department of Pathology, Dhaka Medical College, sent from different parts of Bangladesh via postal service for histopathological examination were included in this study. ***Result*:** Satisfactory liver tissue samples for histological evaluation were available in 200 autopsy specimens (155 male and 45 female) with a mean age of 39.50±14.76 years. Out of 200 cases, the most common lesion was steatosis in 35(17.50%) cases. Steatosis mild, moderate and severe were found in 20(10%) cases, 9(4.50%) cases and 6(3.0%) cases respectively. Steatohepatitis was found in 16(8.0%) cases. Steatohepatitis with fibrous portal expansion, steatohepatitis with bridging fibrosis and steatohepatitis with cirrhosis were detected in 7(3.5%), 6(3%) and 3(1.5%) cases respectively. ***Conclusion*:** A high prevalence of steatosis and steatohepatitis was detected in postmortem liver samples of Bangladesh. Since both diseases can have serious clinical consequences, they should be considered as an important threat to the health of the general population of our country.

Keywords: Autopsy, Steatosis, Steatohepatitis.

INTRODUCTION

Globally, liver problems are a common cause of illness. A wide range of metabolic, chemical, microbiological, and circulatory insults can harm the liver. Because the liver is a favoured site for the spread of various tumors, the disease may be primary in some cases while being secondary in others [1]. The term "liver disease" refers to a variety of illnesses and conditions that impair or completely stop the liver's function [2]. Geographically, the underlying causes of chronic liver disorders differ depending on factors including socioeconomic status, way of life, nutrition, local or regional infections, and other endemic diseases [1]. Fatty liver disease, hepatitis, glycogen storage disease, cirrhosis, primary and secondary malignancies, hemangiomas, granulomas, chronic congestion, cystic lesions, and other abnormalities can be discovered during the liver autopsy [3]. When intrahepatic fat accounts for at least 5% of the liver's weight, hepatic steatosis is present [4]. Simple triacylglycerol buildup in the liver may be hepatoprotective; but, persistent hepatic lipid storage may result in severe nonalcoholic fatty liver disease, inflammation, and liver metabolic dysfunction [4]. Steatosis may be accompanied by signs of liver cell damage and related systemic inflammation. Steatohepatitis is the name given to this set of results [5]. Under normal circumstances, the liver does not accumulate TAG; nevertheless, in stressful situations, such as obesity or high fat/high carbohydrate diets, aberrant lipid metabolism results in ectopic hepatic lipid buildup. Individuals with steatosis exhibited 50% greater rates of lipolysis and 30% higher rates of gluconeogenesis, with increased mitochondrial oxidative metabolism causing oxidative stress and liver damage, according to a study comparing participants with low (3%) and high (17%) intrahepatic TAG levels [6]. Steatohepatitis with or without fibrosis and simple hepatic steatosis are included in the spectrum of liver illnesses known as NAFLD [7]. Hepatic steatosis is frequently seen as a mild disorder. For people with

uncomplicated fatty liver disease, the risk of developing cirrhosis ranges from 0.5% to 1% [8]. Increased systemic inflammation is independently correlated with hepatic steatosis [9]. A form of fatty liver disease known as steatohepatitis is characterized by concurrent liver inflammation and fat accumulation. Histological evidence of either fat alone, fat with inflammation, adipocytes, hepatocyte damage (ballooning degeneration) or fat with fibrosis and cirrhosis are used to diagnose steatosis and steatohepatitis [10].

METHODOLOGY

The study was a Cross-sectional descriptive study which was conducted at the department of pathology, Dhaka Medical College, Dhaka, Bangladesh with an aim to evaluate the frequency of steatosis and steatohepatitis in autopsy specimens of liver. This will provide a framework for the clinician for persuing further diagnostic studies. A total number of 200 autopsy specimens of liver received at the Department of Pathology, Dhaka Medical College during the period of January 2011 to December 2012 were included in this study. The selection was made irrespective of their previous medical records and then investigated for pathological lesions. After collection, the data were checked and cleaned, followed by editing, compiling, coding and categorizing according to the objectives and variable to detect errors and to maintain consistency, relevancy and quality control. Collected data were edited and analyzed according to the objectives and variables by IBM software- Statistical package for Social Science (SPSS 25) version. Ethical clearance was taken from the ethical committee of Dhaka Medical College, Dhaka, Bangladesh.

RESULT

Total cases were grouped according to their age falling in decades. Figure 1 shows the distribution of deceased in different age groups. There was no case below 8 years age or above 78 years.

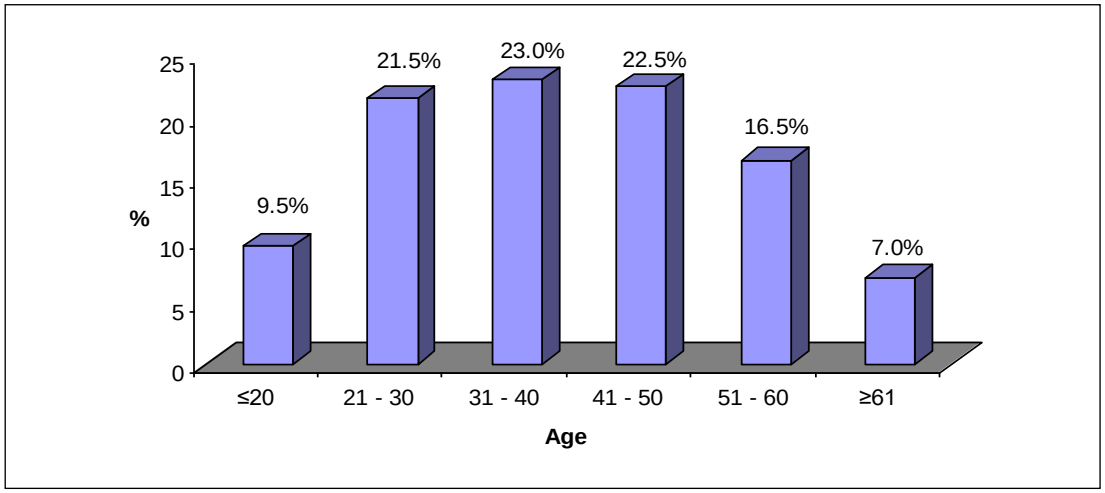

Figure 1: Distribution of deceased according to age group

Figure 2 shows the distribution of deceased according to sex. The male and female ratio was 3.4: 1.

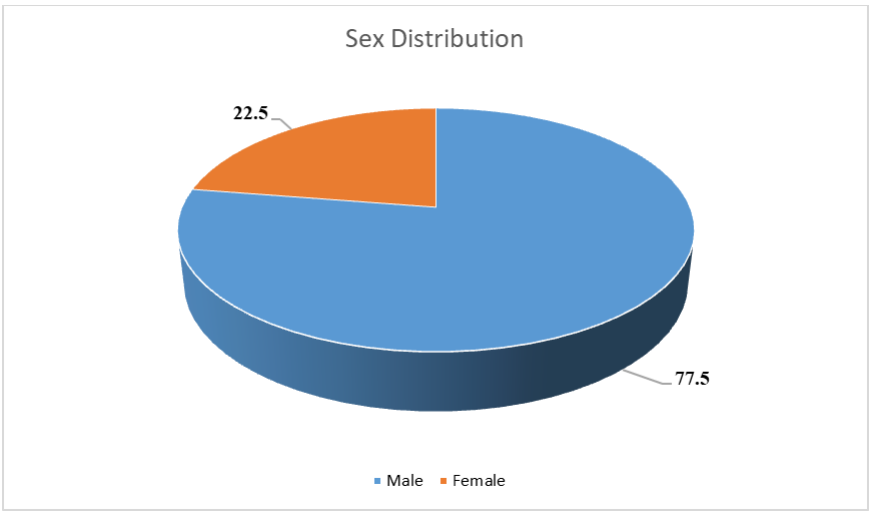

Figure 2: Distribution of deceased according to sex

Table -1 shows the frequency of steatosis and steatohepatitis in autopsy series of 200 deceased. The distribution was based on histologic diagnosis. Among all the cases 10% had mild steatosis, 4.5% had moderate and 3% had severe. Regarding Steatohepatitis 3.5% had Steatohepatitis with fibrous portal expansion, 3% had Steatohepatitis with bridging fibrosis and 1.5% had Steatohepatitis with cirrhosis.

Table 1: Frequency of steatosis and steatohepatitis observed by histologic evaluation in autopsy series

Diagnosis	Frequency	Percent
Normal (No significant change)	149	74.5
Steatosis, Mild	20	10
Steatosis, Moderate	9	4.5
Steatosis, Severe	6	3.0
Steatohepatitis with fibrous portal expansion	7	3.5
Steatohepatitis with bridging fibrosis	6	3.0
Steatohepatitis with cirrhosis	3	1.5

Table-2 shows the frequency of steatosis and steatohepatitis in autopsy series with their confidence interval (95% CI). In our observation, steatosis was found in 35(17.5%) cases. In the population at 95% CI, this disease was within 8.20%–17.23% range. Steatohepatitis was detected in 16 (8.0%) cases, 95% CI of estimated population of this disease was within 3.47% – 10.19% range. Diseases with fibrous portal expansion were in 7(3.5%) cases, diseases with bridging fibrosis were in 6(3%) and cirrhosis were in 3(1.5%) cases.

Table 2: Frequency of steatosis and steatohepatitis in autopsy series at 95%CI

Diagnosis	Frequency	Percent	95% CI	
			Lower	Upper
No significant change (Normal)	149	74.5	60.22	73.14
Steatosis	35	17.5	8.20	17.23
Steatohepatitis	16	8.0	3.47	10.19

Table-3 shows degree of portal inflammation in steatosis and Steatohepatitis. Mild portal inflammation was present in 1(0.5%) cases, moderate portal inflammation in 12(6%) cases and marked portal inflammation in 3(1.5%) cases.

Table 3: Degree of portal inflammation in steatosis and Steatohepatitis

Diagnosis	Absence of portal inflammation (n=184)		Mild (Sprinkling of inflammatory cells in <1/3 of portal tracts) (n=1)		Moderate (increased inflammatory cells in 1/3- 2/3 of portal tracts) (n=12)		Marked (Dense packing of inflammatory cells in >2/3 of portal tracts) (n=3)		Total (n=200)
	n	%	n	%	n	%	n	%	N
Normal (No significant change is seen)	149	80.9	0	0.0	0	0.0	0	0.0	149
Steatosis, grade-1	20	10.8	0	0.0	0	0.0	0	0.0	20
Steatosis, grade-2	9	4.8	0	0.0	0	0.0	0	0.0	9
Steatosis, grede-3	6	3.2	0	0.0	0	0.0	0	0.0	6
Steatohepatitis with fibrous portal expansion	0	0.0	1	100	6	50	0	0.0	7
Steatohepatitis with bridging fibrosis	0	0.0	0	0.0	6	50	0	0.0	6
Steatohepatitis with cirrhosis	0	0.0	0	0.0	0	0.0	3	100	3
Total	**184**		**1**		**12**		**3**		**200**

Table-4 shows extent of fibrosis in steatosis and Steatohepatitis. Fibrosis was evaluated in both H&E and in Masson's Trichrome stain. Fibrosis was seen in the form of perivenular, perisinusoidal, fibrous portal expansion, bridging fibrosis and forming cirrhotic nodules. Diseases with fibrous portal

expansion were in 7(3.5%) cases, diseases with bridging fibrosis were in 6(3%) and cirrhosis were in 3(1.5%) cases.

Table 4: Extent of fibrosis in steatosis and Steatohepatitis

Diagnosis	**No fibrosis (n=184)**		**Fibrous portal expansion (n=7)**		**Bridging fibrosis (Portal- Portal or Portal-central linkage) (n=6)**		**Cirrhosis (n=3)**		**Total (n=200)**
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**N**
Normal (No significant change is seen)	149	83.2	o	0.0	0	0.0	0	0.0	149
Steatosis, grade-1	20	8.7	0	0.0	0	0.0	0	0.0	20
Steatosis, grade-2	9	3.7	0	0.0	0	0.0	0	0.0	9
Steatosis, grede-3	6	2.5	0	0.0	0	0.0	0	0.0	6
Steatohepatitis with fibrous portal expansion	0	0.0	7	100	0	0.0	0	0.0	7
Steatohepatitis with bridging fibrosis	0	0.0	0	0.0	6	100	0	0.0	6
Steatohepatitis with cirrhosis	0	0.0	0	0.0	0	0.0	3	25.0	3
Total	**184**		**7**		**6**		**3**		**200**

Table- 5 shows Steatohepatitis was found in 3(25.0%) cases in age 40 years or less and in 9(75.0%) cases above 40 years of age. The difference of frequency of steatohepatitis between two age groups (≤40 years and >40 years) was statistically significant (Chi square value 04.32, p<0.05).

Table 5: Difference of frequency of steatohepatitis between age groups (n=200)

Age (years)	**Steatohepatitis present**	**Steatohepatitis absent**	**Chi Square value**	**P value**
≤40	3 (25.0%)	105 (55.9%)	4.32	0.037[s]
>40	9 (75.0%	83 (44.1%)		
Total	**12**	**188**		

s=significant, P value reached from chi square test

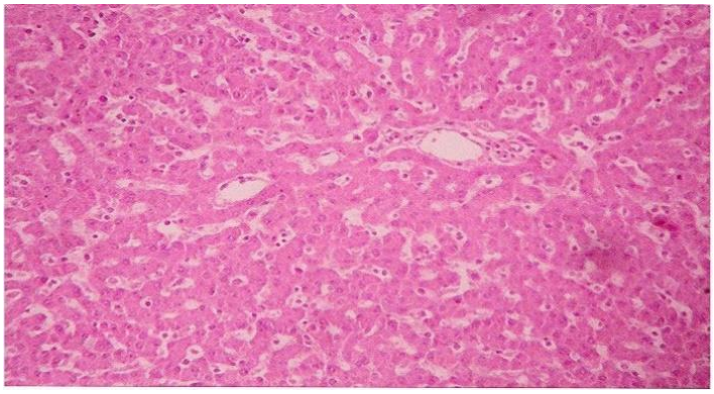

Figure III: Photomicrograph shows normal liver

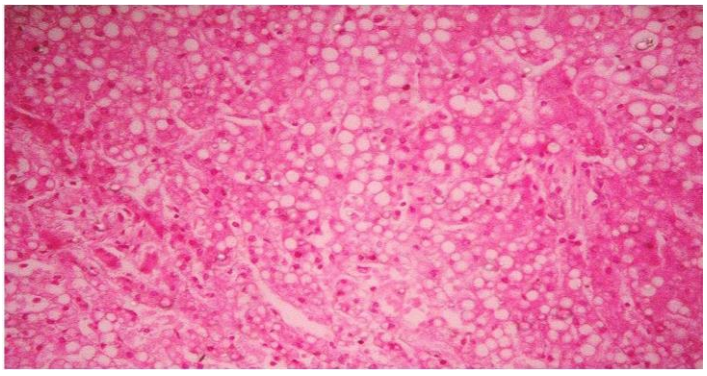

Figure IV: Photomicrograph shows microvesicular steatosis

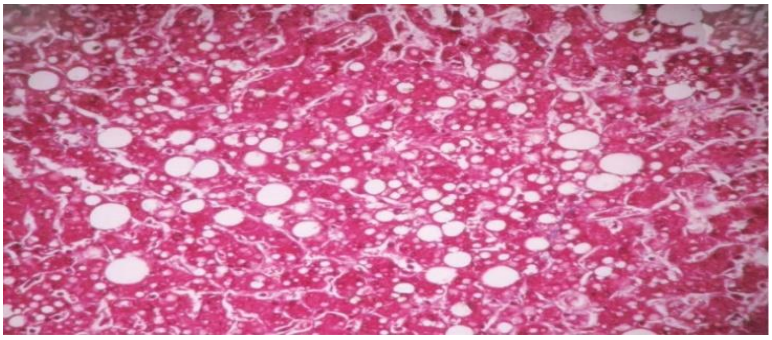

Figure V: Photomicrograph showing macrovesicular & microvesicular steatosis

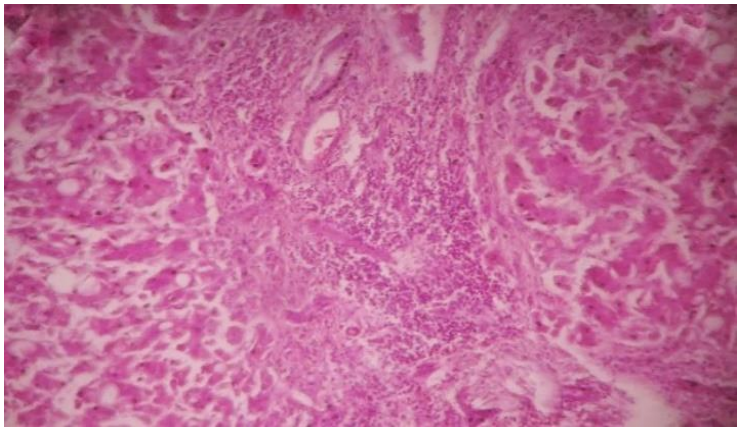

Figure VI: Photomicrograph showing marked portal inflammation & fibrous portal expansion

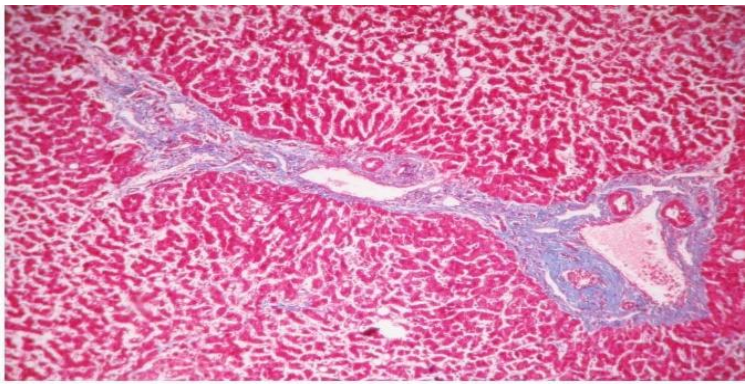

Figure VII: Photomicrograph showing steatohepatitis with bridging fibrosis

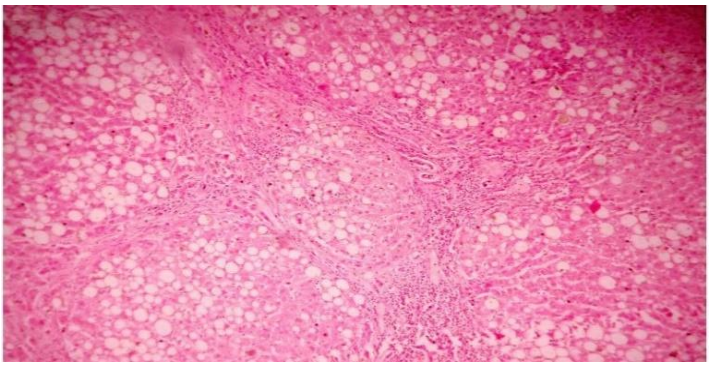

Figure VIII: Photomicrograph showing steatohepatitis with cirrhosis

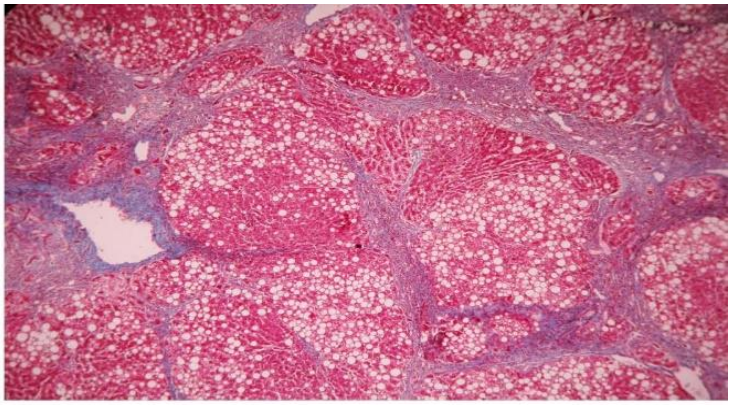

Figure IX: Photomicrograph showing steatohepatitis with cirrhosis

DISCUSSION

Incidental autopsy findings can contribute in discovering many of the common liver diseases. The present study demonstrated that steatosis and steatohepatitis are emerging as common silent liver diseases in our country. This study was carried out at the Department of Pathology, Dhaka, Bangladesh medical college with an aim to evaluate the frequency of steatosis and steatohepatitis in autopsy specimens of liver in the general population of Bangladesh. This will provide a framework for the clinician for perusing further diagnostic studies. A total number of 200 autopsy specimens of liver received at the Department of Pathology, Dhaka Medical College during the period of January 2011 to December 2012 were included in this study. The selection was made irrespective of their previous medical records and then investigated for pathological lesions.

In this current study the mean age was 39.50±14.7 years with range from 8 to 78 years. Majority (23%) of the studied subjects were in the 4th decade. In a similar study done by Sotoudehmanesh, *et al.,* [1] found mean age 43.8 ±19.7 years. On the other hand, Permutt, *et al.,* [11] observed higher mean age, and it was 48.1±1.7 years. The mean age is influenced by the life expectancy of a particular country.

In this study 155 were male (77.5%) and 45 were female (22.5%). The male and female ratio was 3.4:1. Sotoudehmanesh, *et al.,* [1] Studied autopsy specimen of liver and their series also had male predominance. This reflects the male dominant social structure in our country where male is involved in more outdoor activities. It is to be mentioned that most of the cases of our series were anonymous and unidentified and the death was mostly unnatural type, like road/railway accident, fall from height, head injury, drowing, burn, unknown etc. The records of the last 3 years of the Department of Pathology have shown that there is a male predominance in overall autopsy specimens received. In our observation, steatosis was found in 35(17.5%) cases. In the population at 95% CI, this disease was within 8.20%–17.23% range. Steatohepatitis was detected in 16 (8.0%) cases, 95% CI of estimated population of this disease was within 3.47% – 10.19% range. In a study in India conducted by Bal, *et al.,* [12] showed steatosis in 39% cases and Sotoudehmanesh, *et al.,* [1] in Tehran showed steatosis in 31.16% cases. In another series obtained by Zois, *et al.,* [13] revealed steatosis in 31.3% cases. Steatohepatitis in the study by Sotoudehmanesh, *et al.,* [1] was 2.1%, whereas Zois, *et al.,* [13] showed 39.8% steatohepatitis in their study. In our study and the study done by Sotoudehmanesh, *et al.,* [1] in Tehran, the frequency of steatohepatitis was lower than that of steatosis. This can be explained as all cases of steatosis do not progress to steatohapatitis. In this present study grading of steatosis was done. In this study mild portal inflammation was present in 1(0.5%) cases, moderate portal inflammation in 12(6%) cases and marked portal inflammation in 3(1.5%) cases. Diseases with fibrous portal expansion were in 7(3.5%) cases, diseases with bridging fibrosis were in 6(3%) and cirrhosis were in 3(1.5%) cases. In a study conducted by Arriaga González FG showed the disease represents a severe damage to the liver parenchyma and therefore more likely to indicate a progressive disease in this fibrosis. Portal vein development was seen in 12.0% cases, diseases with connecting fibrosis in 3.55 cases and cirrhosis in 4.0% cases [14].

Limitations of the Study

The present study was conducted in a very short period due to time constraints and funding limitations. The small sample size was also a limitation of the present study. History of alcohol intake and drug abuse were also lacking in this study.

CONCLUSION

More people are currently developing steatosis and steatohepatitis than any other type of liver disease. Cirrhosis and liver cancer develop from necro-inflammatory alteration and early fibrosis in these illnesses. This study could serve as a future strategy for early therapeutic intervention in the treatment of individuals with steatosis and steatohepatitis by understanding the rising prevalence.

RECOMMENDATION

This study can serve as a pilot to much larger research involving multiple centers that can provide a nationwide picture, validate regression models proposed in this study for future use and emphasize points to ensure better management and adherence.

ACKNOWLEDGEMENTS

The wide range of disciplines involved in Steatosis and Steatohepatitis in Autopsy Specimens of Liver research means that editors need much assistance from referees in the evaluation of papers submitted for publication. I am very grateful to many colleagues for their thorough, helpful and usually prompt responses to requests for their opinion and advice.

DECLARATION

Funding: None funding sources.

Conflict of Interest: None declared.

Ethical Approval: The study was approved by the ethical committee of Dhaka Medical College, Dhaka, Bangladesh.

REFERENCES

1. Sotoudehmanesh, R., Center, T., Ainechi, S., & Kolahdoozan, S. page: Is Lower Gastrointestinal Endoscopy Needed in Young Patients with Bleeding Anal Fissures?.
2. Carrion, A. F., Ghanta, R., Carrasquillo, O., & Martin, P. (2011). Chronic liver disease in the Hispanic population of the United States. *Clinical Gastroenterology and Hepatology*, *9*(10), 834-841.
3. Behera, A., Sahu, A., Nayak, S. K., & Aggarwal, K. C. (2017). Liver autopsy study-incidental pathological findings. *Pathology update: Trop J Path Micro*, *3*(4), 390-5.
4. Nassir, F., Rector, R. S., Hammoud, G. M., & Ibdah, J. A. (2015). Pathogenesis and prevention of hepatic steatosis. *Gastroenterology & hepatology*, *11*(3), 167.
5. Ludwig, J., Viggiano, T. R., Mcgill, D. B., & Oh, B. J. (1980, July). Nonalcoholic steatohepatitis: Mayo Clinic experiences with a hitherto unnamed disease. In *Mayo Clinic Proceedings* (Vol. 55, No. 7, pp. 434-438).
6. Sunny, N. E., Parks, E. J., Browning, J. D., & Burgess, S. C. (2011). Excessive hepatic mitochondrial TCA cycle and gluconeogenesis in humans with nonalcoholic fatty liver disease. *Cell metabolism*, *14*(6), 804-810.
7. Chalasani, N., Younossi, Z., Lavine, J. E., Diehl, A. M., Brunt, E. M., Cusi, K., ... & Sanyal, A. J. (2012). The diagnosis and management of non-alcoholic fatty liver disease: Practice Guideline by the American Association for the Study of Liver Diseases, American College of Gastroenterology, and the American Gastroenterological Association. *Hepatology*, *55*(6), 2005-2023.
8. Adams, L. A., & Angulo, P. (2005). Recent concepts in non-alcoholic fatty liver disease. *Diabetic medicine*, *22*(9), 1129-1133.
9. Ndumele, C. E., Nasir, K., Conceiçao, R. D., Carvalho, J. A., Blumenthal, R. S., & Santos, R. D. (2011). Hepatic steatosis, obesity, and the metabolic syndrome are independently and additively associated with increased systemic inflammation. *Arteriosclerosis, thrombosis, and vascular biology*, *31*(8), 1927-1932.
10. Angulo, P. (2002). Nonalcoholic fatty liver disease. *New England Journal of Medicine*, *346*(16), 1221-1231.
11. Permutt, Z., Le, T. A., Peterson, M. R., Seki, E., Brenner, D. A., Sirlin, C., & Loomba, R. (2012). Correlation between liver histology and novel magnetic resonance imaging in adult patients with non-alcoholic fatty liver disease–MRI accurately quantifies hepatic steatosis in NAFLD. *Alimentary pharmacology & therapeutics*, *36*(1), 22-29.
12. Fujii, H., Ikura, Y., Arimoto, J., Sugioka, K., Iezzoni, J. C., Park, S. H., ... & Ueda, M. (2009). Expression of perilipin and adipophilin in nonalcoholic fatty liver disease; relevance to oxidative injury and hepatocyte ballooning. *Journal of atherosclerosis and thrombosis*, *16*(6), 893-901.
13. Zois, C. D., Baltayiannis, G. H., Bekiari, A., Goussia, A., Karayiannis, P., Doukas, M., ... & Tsianos, E. V. (2010). Steatosis and steatohepatitis in postmortem material from Northwestern Greece. *World journal of gastroenterology: WJG*, *16*(31), 3944.
14. Arriaga González, F. G. Evaluation of the protective effects of Time-Caloric Restriction in liver fibrosis in a DEN model.